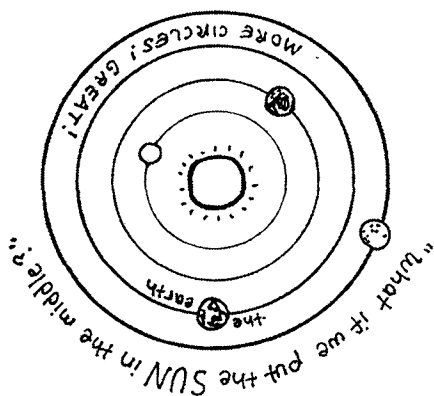


but - it just didn't add up!  
 Q: what was wrong with the calculations?

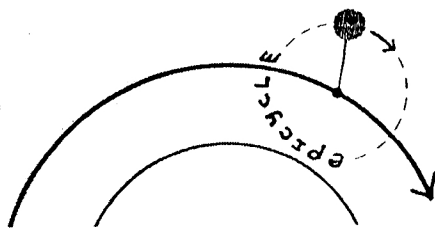


Then this dude COPELNICUS came along, and was like:  
 "aren't these epicycles a little SILLY?"  
 (plus complex!)

Circles within circles? Perfect!  
 were added into the picture.

IF epicycles  
 (def: circular, looping paths created by a rotating rod)

Mathematically, this circular, EARTH-CENTERED setup accurately explained our observations from earth...



A: he was STILL using Circles.  
 for NO reason at all.

say hi to our friend, the ellipse!

a CIRCLE is just a special type of ellipse, whose ECCENTRICITY (def. how oval an oval is) equals zero.

The problem was, the planets' orbits are all very CLOSE to being circular.

CAN YOU TELL THE DIFFERENCE

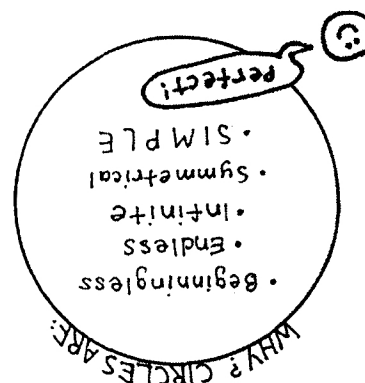
hint: on left we have a circle, on right we do not.

The earth's eccentricity is only 0.016710219 but it makes all the difference.

Three cheers for a SUN CENTERED universe!

Ellipses save the day!

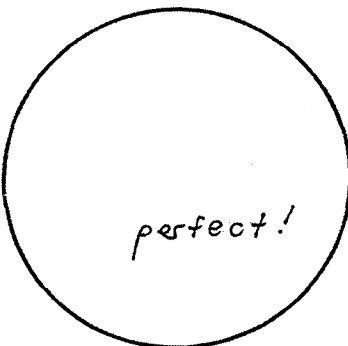
& TO THE ANCIENT GREEKS, THE HEAVENS WERE THE SUMMUM OF PERFECTION



spheres and circles were all the rage in ANCIENT GREECE!

the EARTH was the center of the universe.

In the beginning,



what did we learn?

- ellipses are pretty cool!
- aesthetic criteria (like the desire for circular perfection) is not very logical,
- simplicity usually overrides complexity.
- you are not at the center of the universe (or ~~even~~ the solar system at least),
- & there's no need to be perfect! (but mathematically accurate is recommended).